PROCESS AND DEVICE FOR PRINTING A SUBSTRATE

The invention pertains to a process for printing on a substrate according to the introductory clause of claim 1 and to a device for implementing the process according to the introductory clause of claim 14.

The present invention claims the priority of German Patent Application DE 102004002132.5, to the disclosure content of which reference is made here.

To print on a substrate, the procedure according to the state of the art is to move the substrate through at least one printing unit of a printing press, where an individual ink of a certain color is applied to the substrate in the one printing unit or in each of them. The printing units of the printing press produce a static, i.e., unchanging, image on the substrate over the entire course of the pressrun. The article in question can be, for example, an advertising brochure. If these types of printed products, which are produced by printing a static image on each copy of the entire run, are to be individualized by providing them with, for example, personal address data, the procedure according to the state of the art is to send the substrates provided with the static image in the printing press to a separate printing device, where they are individualized offline. Accordingly, at least one dynamic or changing image, namely, personal address data, is added to the static print image by a process which is offline with respect to that by which static image is produced. The production of static print images individualized with dynamic or changing print images in this way is both complicated and expensive.

Against this background, the present invention is based on the problem of creating a novel process for printing on a substrate.

This problem is solved by a process for printing on a substrate according to claim 1. According to the invention, the substrate is moved through at least one printing device installed inline with the printing unit or with each printing unit, preferably installed downstream from it, so that the static or unchanging image can be individualized by the addition of at least one dynamic or changing image.

In accordance with the present invention, it is proposed that, after the static or unchanging image has been produced on the substrate, the substrate, for the purpose of individualizing it, is moved inline through at least one printing device installed upstream or downstream from the printing unit serving to produce the static image. According to the present invention, the process of individualizing the static image by adding one or more dynamic images to it is thus carried out inline and therefore in a single workflow. As a result, these types of printed articles can be produced more quickly, more easily, and more cheaply.

According to an advantageous elaboration of the invention, at least the functionality "color" is printed in the printing unit or in each of the printing units used to print the static or unchanging image, whereas at least one functionality different from the functionality "color" is printed in the printing device or in each of the printing devices used to print the dynamic or changing image.

The functionality different from the functionality "color" preferably consists of individual text data and/or fragrances and/or varnishes and/or electric conductors and/or semiconductor circuits.

An especially preferred embodiment of the process according to the invention is one in which image information from three different data streams is printed inline in a single workflow. The first data stream in this case consists of the static or unchanging image data;

the second data stream consists of the dynamic or changing text and/or image data serving to individualize and/or partially to individualize the substrate; and the third data stream consists of the dynamic or changing logistics data.

The device according to the invention for implementing the inventive process has at least one printing unit for printing a static or unchanging image and at least one printing device for individualizing the static image by adding at least one dynamic or changing image, installed inline with the printing unit or with each printing unit, preferably installed downstream from it. To ensure an integrated data flow, the device according to the invention preferably includes an open-loop or closed-loop control unit, which controls the printing unit or each printing unit used to print the static or unchanging image and the printing device or each printing device used to print the dynamic or changing image.

Preferred elaborations of the invention can be derived from the subclaims and from the following description.

An exemplary embodiment of the invention, to which the invention is not to be considered limited, is explained in greater detail below:

Figure 1 shows a schematic diagram of a device according to the invention for implementing the process for printing on a substrate according to the invention.

The present invention is described in greater detail below with reference to Figure 1.

Figure 1 shows in schematic form a system diagram of an inventive device 10 for printing a substrate, where, in the exemplary embodiment of Figure 1, the device comprises a printing unit 10 for printing a static or unchanging image on a substrate 11. Although only one of these printing units 10 is shown in Figure 1, it is obvious that several of these units 10 can be set up in a row. To produce the static or unchanging image on the substrate 11, one

process color is applied in each of the printing units 10 used to produce the static or unchanging image. In the case of an autotypic combination printing process, this means that, as a rule, four printing units will be set up in a row to produce or to print the static or unchanging image, where each of these four printing units prints one of the four process colors, i.e., either black, cyan, magenta, or yellow.

The device according to the invention of Figure 1 comprises not only the printing unit 10 for printing the static or unchanging image but also two printing devices 12, 13, installed downstream from the printing unit 10. These printing devices are used to individualize the static or unchanging image printed in the printing unit 10 by adding a dynamic or changing image to it. Thus it can be derived from Figure 1 that the substrate 11 to be printed moves for printing in the direction of the arrow 14 first through the printing unit 10 and then through the printing devices 12 and 13.

After the substrate has left the printing unit 10, it carries the static or unchanging image. The static image is then individualized by the addition of dynamic or changing images in the printing devices 12 and 13. It can be derived from Figure 1 that each of the printing devices 12 and 13 individualizes the static image by adding a dynamic or changing image to different sections or areas. Although two printing devices 12 and 13 for individualizing the static image by adding dynamic images are shown in Figure 1, it is obvious that only one such printing device or more than two such printing devices could be installed inline with the printing unit or with each printing unit used to produce the static image.

The printing unit 10 or each printing unit for printing the static or unchanging image is preferably designed as an offset printing unit or as a gravure printing unit or as a flexographic printing unit. The printing unit 10 shown in Figure 1 is a digital offset printing unit, like the

ones sold by the applicant under the product name DICOweb. The printing devices 12 and 13 for printing the dynamic or changing image are preferably ink-jet printing devices. In place of such ink-jet printing devices, it would also be possible to use dynamic printing devices which are based on the principle of electrophotography, magnetography, electrocoagulation, or ionography.

In the exemplary embodiment according to Figure 1, as previously mentioned, a static or unchanging image is applied to the substrate 11 in the printing unit 10, where the functionality "color" is printed to obtain the static or unchanging image. In the two printing devices 12 and 13 installed downstream from the printing unit 10, the static image is individualized by the addition of one or more dynamic or changing images, which represent a functionality different from the functionality "color". For example, the printing devices 12 and 13 can print, as their functionality, individual text data and/or individual image data and/or individual logistics data and/or fragrances and/or varnishes and/or electrical conductors and/or semiconductor circuits.

In a concrete exemplary embodiment, it will be assumed that an advertising flyer of an automobile manufacturer is to be printed on the substrate 11. To produce the advertising flyer, it is possible to operate with the help of the present device according to the invention and to use the process according to the invention in such a way that first a static or unchanging image is printed on the substrate 11 in the printing unit 10 to obtain the total number of copies N desired. After this static or unchanging image has been produced in the printing unit 10, the static or unchanging image is partially individualized in the printing device 12, in that a partial quantity n of the total pressrun N of the flyer is individualized by the addition of an individual or dynamic image. This can be, for example, an image of an

actual motor vehicle made by the automobile manufacturer. After the static or unchanging image has been partially individualized in the printing device 12, the final individualization is accomplished inline in the printing device 13, in which personal address data are printed.

In an especially preferred embodiment, dynamic or changing logistics data, e.g., logistics codes and/or postage stamps, are also printed. In this case, image data from three different data streams are printed inline in one workflow, namely, a static or unchanging image, the dynamic or changing text and/or image data serving to individualize and/or partially to individualize the flyer, and dynamic or changing logistics data.

In this case, the dynamic or changing images printed in the printing devices 12 and 13 are preferably combined in such a way that the image printed for partial individualization in the printing device 12 is coordinated with the individual address data printed in the printing device 13. As a result, target group-oriented prospectuses and advertising materials can be produced rapidly at low cost.

As previously mentioned, a static or unchanging image is produced in the printing unit 10 on all copies of the flyer to be produced. In the downstream printing device 12, the static image produced in the printing unit 10 is partially individualized inline by the addition of a first dynamic image aimed at a first customer group, such as customers in the age range of 20-40 years. An automobile manufacturer, therefore, can use the printing device 12 to print an image of, for example, the newest sports car model onto the section of the static image to be individualized and thus target customers who are between 20 and 40 years of age. After this partial individualization, the corresponding customer-specific address data are printed on the flyer in the printing device 13. From the total run N of the flyer produced in the printing unit 10, therefore, a partially individualized flyer with a run of n is produced in the printing device

12. This flyer is then given its final individualization by the addition of individual customer data in the printing device 13. If desired, individual logistics data can also be printed inline. Such data can consist of a logistics code and a postage stamp.

Once the flyers have been printed out for all of the customers in the database between 20 and 40 years of age, the present invention makes it possible for the automobile manufacturer to use the printing device 12 partially to individualize the static image produced in the printing unit 10 by adding an image of the newest luxury model and thus to target a customer group of independent persons between 50 and 60 years old. The printing device 13 is then used to produce the final individualization of the printed article by adding the individual address data.

As can be seen in Figure 1, a common open-loop or closed-loop control unit 15 is assigned to the printing unit 10 and to the printing devices 12 and 13 integrated inline with the printing unit 10. The common open-loop or closed-loop control unit 15 thus serves to control all of the integrated inline printing units 10 and printing devices 12 and 13. As a result, it is possible to establish an integrated data or information stream. In the exemplary embodiment of Figure 1, this means that, first, data 16 for the static or unchanging image to be printed in the printing unit 10 and data 17 for the dynamic or changing images to be printed in the printing devices 12 and 13 are sent to a printing setup system 18, which then transmits the final printing setup data to the open-loop or closed-loop control unit 15. All of the data required to produce the individualized printed articles are accordingly brought together in a single workflow. This opens up completely new possibilities for the production of printed articles. The data 17 comprise preferably individual text and/or image data 19 and individual logistics data 20.

List of Reference Numbers

10	printing unit
11	substrate
12	printing device
13	printing device
14	arrow
15	control unit
16	data
17	data
18	printing setup system
19	data
20	data